Biological Evaluation
Douglas-fir Tussock Moth
South Central Idaho
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INTRODUCTION

Reports received from Ranger District personnel and other persons this year informed Boise Zone personnel of the presence of Douglas-fir tussock moth in southern Idaho in locations other than the known infestation in Owyhee County. Followup aerial surveys and ground checks revealed approximately 11,000 acres of tussock moth infestation. The widely scattered infestations occur primarily along an east-west line from Little Wood Reservoir to Featherville, Idaho.

Some 1,200 acres will require control if further defoliation and tree damage are to be prevented. The areas of concern are on private lands northeast of Fairfield, Idaho.

The tussock moth is native to southern Idaho and is endemic most years. Rapid population buildups and declines have been common at periodic intervals in past years and in the same general locations where they are presently. From 1936 to 1939 outbreaks occurred in widely scattered locations along the Little Wood River, both inside and outside the Sawtooth National Forest boundary. The last reported infestations occurred in several drainages of the Big Smokey area of the Sawtooth National Forest in 1946. No previous southern Idaho infestations have been controlled.

Most of the infested areas occur in scattered isolated stands of pure Douglas-fir. None of the infested areas are considered a threat to nearby continuous stands of Douglas-fir.

GENERAL INFORMATION

Causal Agent - Douglas-fir tussock moth, Orgyia pseudotsugata McD.

Host - Douglas-fir.

Location - Scattered locations on an east-west line from Little Wood Reservoir to Featherville, Idaho. (See attached map.)

Type of Damage - Defoliation, top kill and light mortality to host type.

Extent of Infestation - 11,000 acres.

BIOLOGICAL INFORMATION

Characteristically tussock moth populations in southern Idaho have a history of sudden buildups, accompanied by moderate to severe defoliation; the populations then undergo rather dramatic collapses. These declines are usually attributable to a native nuclear polyhedrosis virus which ravages larval and pupal populations, plus moderate to heavy parasitism and predation by hymenopterous and dipterous insects.

Larvae suspected of being infected by a polyhedrosis virus were collected from four sites in July and August 1973. All specimens were found to contain viable nuclear polyhedrosis bodies indicating a good degree of infection. Visual observations showed countless thousands of dead larvae hanging head down and filled with fluid in a manner typical of virus infection. Determination of virus presence in the populations was verified by Dr. C. H. Thompson, Forest Insect Disease Laboratory, Corvallis, Oregon.

During October, collections of cocoons were made to determine pupal parasitism. Some pupae had more than one parasite and some pupae were probably killed by virus. The data from laboratory rearings of these collections are shown in the following table.

DOUGLAS-FIR TUSSOCK MOTH PUPAL PARASITISM
FROM THREE LOCATIONS IN 1973

Area	No. Cocoons	No. Emerged Parasitic Wasps & Flies	Moth Emergence	% Parasitism
Little Water Creek	106	104	1	98
Powell Creek	106	73	4	69
Slaughterhouse Creek	69	52	1	75
Total	281	229	6	242
Average	93.7	76.3	2	80.7

The foregoing data were taken from the east-west extremes and roughly the mid-point of the widely scattered defoliated area. Even though only three locations were sampled, it is apparent that the high degree of parasitism was partially responsible for severely reducing populations.

Three surveys were employed in obtaining egg mass data. These were a single tree sampling system heavily biased to obtain indications of the presence of new egg masses; an eight-tree/plot with four branches/tree system used to determine new-old egg mass ratios, and a fifty tree sample to determine presence or absence and ratios of new to old egg masses.

In late September 1973, a preliminary egg mass survey was done by felling whole trees and counting new-old egg masses. Following is a summary of results:

DOUGLAS-FIR TUSSOCK MOTH 1973
WHOLE (FELLED) TREE EGG MASS SAMPLES

Location	No. Trees Samples	Egg Masses New	Egg Masses Old	Ratio New	Ratio Old
Little Water Creek	3	0	92	--	92
Kelly Creek	4	1	128	.008	1
Willow Creek	2	1	84	.01	1
Powell Creek #1	3	161	175	.92*	1
Powell Creek #2	2	4	49	.08	1
Elk Creek (Blowout)	1	42	38	1.1*	1
Slaughterhouse	7	18	932	.02	1
Bell Mountain (J. Peavy)	3	3	136	.02	1
Abbott Gulch - east	2	0	78	--	78
Abbott Gulch - west	2	0	52	--	52
	29	230	1,764		

*Approaches or exceeds a new-old egg mass ratio of 1:1. This group of samples indicated two areas, Powell and Elk Creek, where continued defoliation will occur in 1974.

The second sample system was used to equate new-old egg masses per thousand square inches of foliage. This consisted of taking whole branch samples from codominant trees. One branch was clipped near the top, two at mid-crown and one at the skirt. Eight trees were sampled in this manner at five separate locations. Results of this type sampling follow:

EIGHT TREE PLOTS
WHOLE BRANCH SAMPLES --- 4 BRANCHES/TREE

Location	No. Egg Masses New	No. Egg Masses Old	Ratio New	Ratio Old	No. Egg Masses/1m $in.^2$
Upper Powell Cr. So.	24	68	.35	1	.4
Upper Powell Cr. No.	117	40	2.93	1	1.6
Little Water Cr.	0	22	---	---	---
Upper Deer Cr.	24	65	.37	1	.6
Gardner Gulch	0	10	---	---	---

The foregoing data show three areas that exceed the >.1/1000 $in.^2$ egg mass density which would place those areas in the high risk category.

The third method of sampling consisted of counting new-old egg masses at the skirt line of 50 trees. A running cumulative account was made of observable new-old egg masses through each sample area. The purpose here was to cover larger areas and thus get a more representative count of new-old egg mass ratios.

NEW-OLD EGG MASS RATIOS - 50 TREE SKIRT SAMPLES

Location	Map #	Egg Masses New	Egg Masses Old	Ratio: New to Old Egg Masses
Skeleton Cr.	1	1	0	* 1:0
Gunsight Peak	2	0	0	---
Camp Gulch	3	0	0	---
OK Gulch	4	1	32	.03:1
Abbott Gulch	5	0	41	---
Powell Cr. No.	6	1	46	.02:1
Powell Cr. So.	9	30	39	.77:1
Blowout Cr.	7	2	8	.25:1
Cannonball Mountain	8	0	0	---
Big Deer Cr. #1	10	2	92	.02:1
Big Deer Cr. #2	11	2	67	.03:1
Mill Canyon #1	12	62	37	1.68:1
Mill Canyon #2	13	1	14	.03:1
Muldoon Canyon	14	2	104	.02:1
		104	480	

*Only one egg mass found on more than 50 trees examined.

DISCUSSION

The 1973 infestation in south central Idaho was different from "typical" infestations in that last year there was no indication of them. This year the infestations caused moderate to heavy defoliation in most of the outbreak areas and have, with one exception, collapsed. That exception is the area northeast of Fairfield, Idaho. The infestation there is in the vicinity of Powell Creek, Deer Creek, Mill Canyon and Elk Creek. It is not anticipated that the infestation in those areas will increase in size.

What direction the infestation will take, and whether or not control should be considered, is indicated by the following factors: degree of defoliation, new to old egg mass ratios, egg mass density per thousand square inches of foliage, virus levels in the eggs, viable egg (larval) densities, and professional entomological judgment.

Virus levels in the eggs will be determined by Dr. C. H. Thompson by March 1974.

Impact plots to assess lasting damage done by the tussock moth were established in southern Idaho for the first time this year. Accordingly we have no data to indicate the damage sustained by trees in this area. However, past infestations in the area and the resultant tree mortality estimated by entomological personnel cause us to believe that tree mortality in southern Idaho will be five percent or less. Top kill and growth loss are not estimated.

The tussock moth populations have collapsed so dramatically in most areas this year that even in the area where populations are indicated for next year, it is anticipated that they will collapse. However, it should be recognized that the populations probably will not collapse until additional defoliation and related damage have occurred.

Timber volume and value estimates by Sawtooth National Forest and Regional Office personnel indicate that the tussock moth could cause in excess of $20,000 loss if not controlled next year.

RECOMMENDATION

If the land owners or managers objectives are to prevent further defoliation and damage, direct control should be undertaken on the indicated areas northeast of Fairfield, Idaho.

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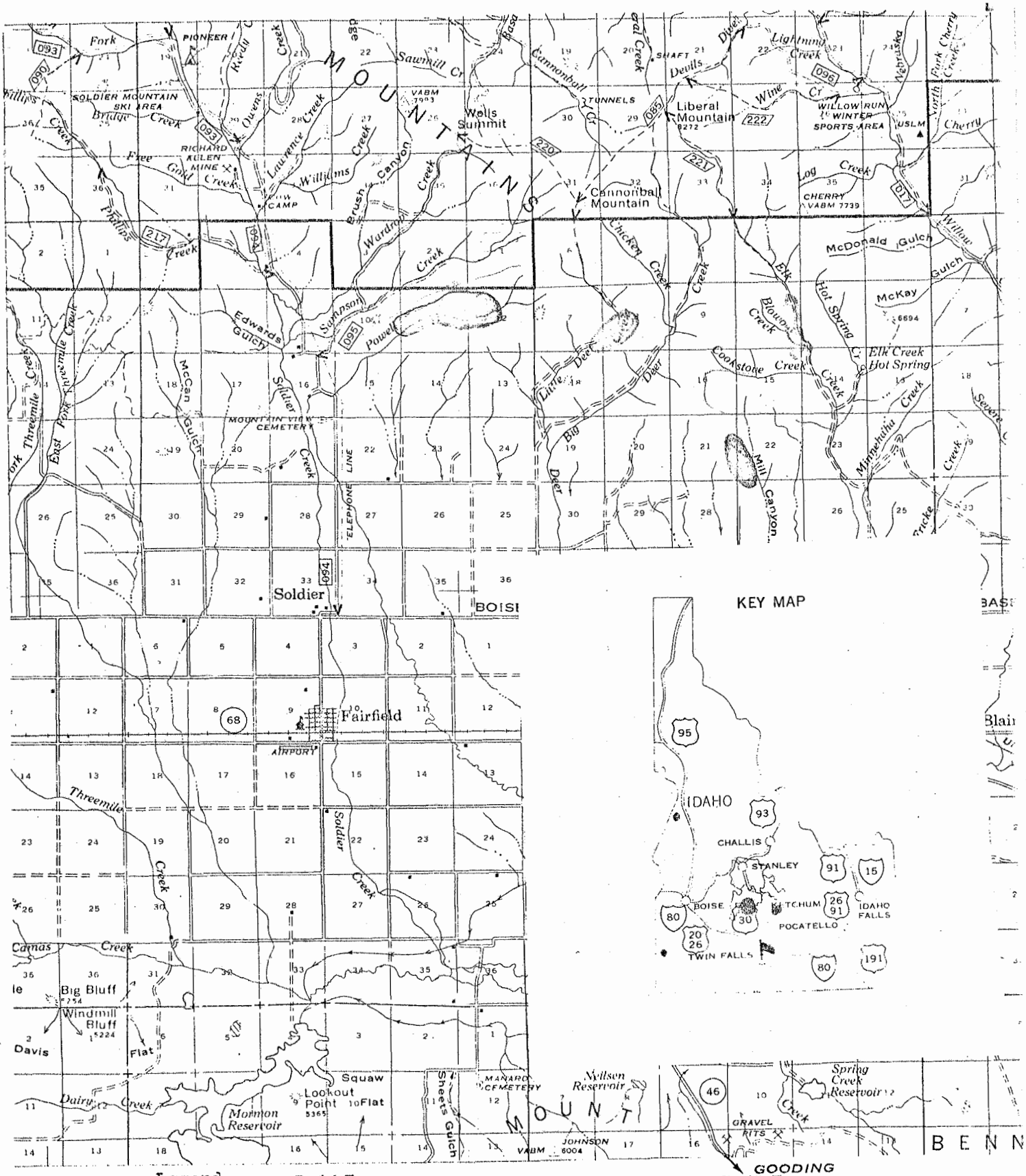

Legend

Areas of 1973 defoliation

Areas of probable 1974 damage (south of Stanley on the key map).

52'30"

45'

37'30"